

irritation of the earth-air, which sometimes sends out flames. It is said that a kind of beast accompanies the thunder, and it moves about in the air. This is nothing strange, because at a certain island called Ampon, which is about 3900 *ri* (1 *ri* = $2\frac{1}{2}$ miles) from Japan, there is a bird called the *Kasubara*, which is covered with fur instead of feathers, and which eats fire. Other birds live on wind. As this world is unlimitedly great and extensive there may have lived strange beasts and birds, like the thunder beast which the Japanese talk about. The volume of sound given out by thunder depends on the number of water-clouds in the air. When the latter is small, the sound of the thunder is not loud and appears far off. On the other hand when the clouds are piled up in the heavens, the sound is loud and is simultaneous with the lightning. The sound is caused by the passage of fire through the water. The ancients regarded thunder as the report of the battle between fire and water—the male and female elements. If this were the case there is no reason for the interval between the flash and the sound. Earthquakes are subterranean thunder; the noise is caused by the rush of water which has long been kept confined by the earth-air. Snow is the vapour which rises from the earth; when it ascends high enough it becomes frozen and falls as snow. Fog is also this vapour. Haze is the vapour mixed with smoke from some volcano. The writer concludes by expressing his intention of making the actions of nature, such as rain, wind, &c.—difficult as they are to explain—quite clear on a future occasion.

These ideas may be taken as representing those of most educated Japanese of half a century ago, with the exception perhaps of a few who had been taught by the Dutch. What the Japanese peasant thought, and still thinks of thunder, earthquakes, storms, and other striking natural phenomena will be found in a deeply interesting chapter of Mr. Griffis's "Mikado's Empire." One of the principal Japanese artists, Hokusai, some of whose works have recently been given to the English public, did not think it beneath his genius to endeavour to picture the extraordinary creatures that form the zoological mythology of Japan. There the astonished student of Japanese pictorial art can behold Futen, the wind demon, Raiden, the creator of thunder, the fish whose movements cause earthquakes, the *kappa*, or demon of the deep, and dragons of sufficient variety of form to satisfy the weirdest imagination.

NOTES

RARELY has so distinguished and representative an assembly been seen in Westminster Abbey as that which met to pay the last honours to Mr. Darwin, on Wednesday last week. The Abbey indeed was crowded. The character of the long line of distinguished men who followed the honoured remains to the grave, may be seen from the list of pall-bearers:—The Duke of Devonshire, the Duke of Argyll, the Earl of Derby, Mr. J. Russell Lowell, the American Minister, Dr. W. Spottiswoode, P.R.S., Sir Joseph Hooker, Mr. A. R. Wallace, Prof. Huxley, Sir John Lubbock, and the Rev. Canon Farrar. Mr. Darwin has been buried close beside the grave of Sir John Herschel, and within two paces of that of Sir Isaac Newton. At the Royal Academy dinner on Saturday, Mr. Spottiswoode, in replying for science, could not but refer to the loss "of our greatest philosopher and noblest spirit." "I know not," he said, "whether, in the presence of statesmen and leaders of thought, of commanders both by sea and land, of artists, of preachers, of poets and men of letters of every kind, it is fitting that I should speak of greatness; but if patience and perseverance in good work, if a firm determination to turn neither to the right hand nor to the left, either for glory or for gain, if a continual overcoming of evil with good in any way constitute

elements of greatness, then the man of whom I speak—Charles Darwin—was truly great. He lived, indeed, to a good age; he lived to complete the great work of his life; he lived to witness a revolution in public opinion on matters with which he was concerned such as few had seen before—a revolution from opposition to concurrence, a revolution from antipathy to sympathy, or whatever else may better express a complete change of front. And so having at the beginning been somewhat rudely pushed aside as an intruder and disturber of accepted opinions, he was in the end not only borne on the shoulders of his comrades to his last resting-place, but was welcomed at the threshold by the custodians of an ancient fabric and of an ancient faith as a fitting companion of Newton and of Herschel, and of the other great men who from time to time have been gathered there."

M. JAMIN, president of the Academy of Sciences, having summoned M. Quatrefages to deliver an *éloge* on the late Mr. Charles Darwin on Monday last, the eminent zoologist read a long and eloquent oration, which was received with unanimous plaudits, and will be printed in the next *Comptes Rendus*.

WE take the following from the *Times*:—The Council of the Royal Society have selected the following fifteen from the fifty-two candidates for the Fellowship who have presented themselves during the present session. The election, which rests with the Fellows of the Society, will take place on Thursday, June 8, at 4 p.m. The names are—Prof. V. Ball, Dr. G. S. Brady, Dr. G. Buchanan, C. Baron Clarke, Francis Darwin, Prof. W. Dittmar, Dr. W. H. Gaskell, Mr. R. T. Glazebrook, Mr. F. Ducane Godman, Mr. J. Hutchinson, Prof. A. Liversidge, Prof. I. Malet, Mr. W. D. Niven, Mr. R. H. Inglis Palgrave, and Mr. W. Weldon.

THE fifty-second Annual Meeting of the British Association for the Advancement of Science will commence in Southampton on Wednesday, Aug. 23. The President-Elect is C. W. Siemens, D.C.L., F.R.S. Vice-Presidents-Elect: The Right Hon. the Lord Mount-Temple, Capt. Sir F. J. Evans, K.C.B., F.R.S., Hydrographer to the Admiralty, F. A. Abel, C.B., F.R.S., Prof. de Chaumont, M.D., F.R.S., Col. A. C. Cooke, R.E., C.B., Director-General of the Ordnance Survey, Wyndham S. Portal, Prof. Prestwich, M.A., F.R.S., Philip Lutley Sclater, F.R.S. General Treasurer: Prof. A. W. Williamson, F.R.S., University College, London, W.C. General Secretaries: Capt. Douglas Galton, C.B., D.C.L., F.R.S., Francis Maitland Balfour, F.R.S. Secretary, Prof. T. G. Bonney, F.R.S. Local Secretaries: C. W. A. Jellicoe, John E. Le Feuvre, Morris Miles. Local Treasurer, J. Blount Thomas. The Sections are the following: A—Mathematical and Physical Science—President, Right Hon. Prof. Lord Rayleigh, F.R.S. Vice-Presidents: G. H. Darwin, F.R.S., Prof. G. C. Foster, F.R.S. Secretaries: W. M. Hicks, M.A., Prof. O. J. Lodge, D.Sc., D. McAlister, M.A., B.Sc. (Recorder), Rev. G. Richardson. B—Chemical Science—President, Prof. G. D. Liveing, F.R.S. Vice-Presidents: A. G. Vernon Harcourt, F.R.S., Prof. H. E. Roscoe, F.R.S. Secretaries: P. Phillips Bedson, D.Sc. (Recorder) H. B. Dixon, F.C.S., J. L. Notter. C—Geology—President, R. Etheridge, F.R.S. Vice-Presidents: Prof. T. Rupert Jones, F.R.S., Prof. J. Prestwich, F.R.S. Secretaries: T. W. Shore, F.G.S., W. Topley, F.G.S. (Recorder), E. Westlake, F.G.S., W. Whitaker, F.G.S. D—Biology—President, Prof. A. Gamgee, M.D., F.R.S. Vice-Presidents: Prof. W. Boyd Dawkins, F.R.S., G. E. Dobson, F.L.S., Prof. M. A. Lawson, F.L.S., Prof. J. D. Macdonald, F.R.S. Department of Anatomy and Physiology:—Prof. A. Gamgee, M.D., F.R.S. (President), will preside. Secretaries: W. Heape, A. Sedgwick, B.A. (Recorder). Department of Zoology and Botany:—Prof. M. A. Lawson, F.L.S. (Vice-President), will preside. Secretaries: W. A. Forbes, F.Z.S. (Re-

order), J. B. Nias. Department of Anthropology:—Prof. W. Boyd Dawkins, M.A., F.R.S., F.S.A., F.G.S. (Vice-President), will preside. Secretaries: G. W. Bloxam, M.A., F.L.S. (Recorder), T. W. Shore, jun., B.Sc. E—Geography:—President: Sir R. Temple, Bart, G.C.S.I. Vice-Presidents: H. W. Bates, F.R.S., Lieut.-Col. H. H. Godwin-Austen, F.R.S. Secretaries: E. G. Ravenstein, F.R.G.S., E. C. Rye, F.Z.S. (Recorder). B—Economic Science and Statistics:—President: Right Hon. G. Sclater-Booth, M.P., F.R.S. Vice-Presidents: W. E. Darwin, F.G.S., R. H. Inglis Palgrave, F.S.S. Secretaries: G. S. Baden-Powell, F.S.S., Prof. H. S. Foxwell, F.S.S., A. Milnes, M.A., F.S.S., Constantine Molloy (Recorder). G—Mechanical Science:—President: John Fowler, C.E., F.G.S. Vice-Presidents: A. Giles, C.E., W. H. Preece, C.E., F.R.S. Secretaries: A. T. Atchison, M.A., F. Churton, H. T. Wood, B.A. (Recorder). The First General Meeting will be held on Wednesday, August 23, at 8 p.m. precisely, when Sir John Lubbock, Bart., M.P., F.R.S., will resign the Chair, and C. W. Siemens, D.C.L., F.R.S., President elect, will assume the Presidency, and deliver an address. On Thursday evening, August 24, at 8 p.m., a *soirée*; on Friday evening, August 25, at 8.30 p.m., a Discourse on Pelagic Life, by Prof. H. N. Moseley, F.R.S.; on Tuesday evening, August 29, at 8 p.m., a *soirée*; on Wednesday, August 30, the concluding General Meeting will be held at 2.30 p.m.

It may be useful for some of our readers to be informed that the following arrangements have been made by the American Association for the Advancement of Science for reduced fares from Europe to Montreal, for those attending the meeting on August 23 next:—The Allan Line will grant ten tickets at \$100 each from Liverpool to Quebec and return; the Dominion Line will grant twenty-five tickets at \$80 each from Liverpool to Quebec and return; the Beaver Line will grant tickets from Liverpool to Quebec and return at \$80 each.

THE eleventh meeting of the French Association for the Advancement of Science will take place at Rochelle, commencing August 24. The General Secretary is Prof. Gariel, 4, rue Antoine Dubois, Paris.

THE honorary degree of LL.D. has been conferred on Mr. J. R. Hind, F.R.S., by the University of Glasgow.

THE death is announced, at the age of forty-eight, of the well-known physicist Prof. Zöllner, of Leipzig.

LADY THOMSON, widow of Sir Wyville Thomson, is to receive a grant of 400*l.* from the Royal Bounty Fund.

THE French Eclipse Expedition has arrived at Alexandria.

ON April 27 the French Academy received M. Pasteur, who has been nominated to fill the chair vacated by the recent death of M. Littré. The ceremony attracted an immense concourse of people, including the *élite* among French *savans* and politicians. M. Pasteur delivered an eloquent address against the opinions of his predecessor, who was partly defended by M. Renan. The two speeches are among the most interesting and elaborate that have been delivered under such circumstances.

WE have received, as specimens of the seismological literature of Japan, reprints of certain translations which have appeared in the *Japan Gazette* newspaper. The first is the narrative of an earthquake shock at Osaka, accompanied by a high wave, in 1707; the second, a similar narrative of a great earthquake in the province of Echigo in 1829; and the third an earthquake chronology. The editor, Prof. Milne, speaks of the first as little more than a series of anecdotes of various events which took place at the time of the disaster; and although the seismologist may not be able to glean many facts of value, the paper will at

least give him a specimen of the kind of literature through which he will have to wade in searching for facts of scientific importance. He adds that he is acquainted with sixty-five Japanese works on the subject, and that in Japan there is a literature on earthquakes comparable with that of any other country, and although much of it may be of interest only to the general reader, much of it has a value scientifically. The second monograph is interesting, on account of the many references it contains to popular beliefs respecting the connection between earthquakes and other natural phenomena. Thus, an unusual warmth in the weather, a change in the colour of the moon, mirage, falling stars, &c., are all referred to as being connected with the approach of an earthquake. The third paper is a translation of an earthquake Calendar, commencing at 295 B.C. and ending with the widespread and destructive earthquakes of 1854. This work shows that, notwithstanding the frequency of these phenomena in Japan, the native chroniclers have always carefully recorded them. Probably nowhere else in the literature of the world can we find so long and complete a record of the recurrence of various natural phenomena—for eclipses, great waves, volcanic eruptions, &c., are also noted—than in this work.

A SERIES of three excursions has been arranged by the Geologists' Association, to afford members an opportunity of becoming acquainted with the physiography and geological character of the Weald. The first excursion, on May 6, will be to Redhill and Crawley; the second, May 30, to Tilgate Forest, Cuckfield, and Hayward's Heath; and the third, May 29 and 30, to the Isle of Purbeck.

THE annual general meeting of the Iron and Steel Institute will take place on May 10, 11, and 12. The papers to be read are:—On certain physical properties of iron and steel, by Mr. Edward Richards, Hematite Steel Works, Barrow-in-Furness; On the use of brown coal in the blast furnace, by Prof. Ritter Peter von Tunner, Leoben, Austria; On the Bilbao iron ore district, by Mr. William Gill, M.I.C.E., Luchana, Bilbao, Spain; On a new method of getting coal, by Mr. Paget Mosley, London; On the compression of fluid steel, by Mr. William Annable, Govan, Glasgow; On the chemical composition and testing of steel rails, by Mr. G. J. Snelus, F.C.S., A.R.S.M., Workington; On the consumption and economy of fuel in iron and steel manufacture, by Mr. J. S. Jeans, London; On the tin plate manufacture, by Mr. Ernest Trubshaw and Mr. E. S. Morris; On the relations of carbon and iron, by Mr. Geo. E. Woodcock, Atlas Works, Sheffield; On a new centre crane for Bessemer plant, by Mr. Thomas Wrightson, M.I.C.E., Stockton-on-Tees.

ON April 30 M. Carlier, one of the most active members of the Académie d'Aérostation Météorologique, made an ascent at the La Villette gasworks, Paris, in order to try if it is possible to steer a balloon by using in the car a large oar composed of a plane fixed perpendicularly to a solid handle worked with two hands. The dimensions of the plane are one metre by two, and the handle is about three metres long. The weight of the sails is counterpoised when worked, and the weight of the whole system is about 10 kilograms. It is the second time that M. Carlier has ascended with this apparatus. Although the air was in a state of great agitation the motions of the balloon were easily seen from the ground. M. Carlier intends to make a series of ascents in order to learn how to make the best of this system, which is to be used only for partial direction, as in the case of Thames barges, which, although they must follow the run of the tides, can be directed to some extent by means of the oars.

THE May number of the *Proceedings* of the Royal Geographical Society contains a paper of much interest by Mr. L. K. Rankin, B.A., on "The Elephant Experiment in Africa." Mr. Rankin

accompanied Capt. Carter on his journey with the three Indian elephants in 1879, meant for the use of one of the Belgian expeditions. In his paper Mr. Rankin gives full details of the conduct of the elephants up to Mpwapwa, where their troubles began. Although they were severely attacked by the Tsetse, no permanent evil effect seems to have followed. At Mpwapwa, indeed, a report was sent to the King of the Belgians, in which it was stated that the elephant experiment was a complete success, on account of their immunity against Tsetse, their ability to live on the uncultivated food of the country, and to march over all kinds of ground. A few days after the report, however, the largest elephant suddenly died. Mr. Rankin attributed its death to insufficient food and over-work. In India it had been stall-fed; in Africa it never seems to have had enough to eat—the back-bones of all these stood six or seven inches from their flanks at Mpwapu. It is clear also that their loads were far beyond what they had been accustomed to. As is known, the other elephants subsequently died. This experiment cannot be considered a fair one, though the lessons it taught will be of service in any future attempt to utilise the animal as a beast of burden in Africa.

A HYDROMOTOR recently invented by Herr Fleischer of Kiel, for propulsion and steering of vessels, acts (we learn from Wiedemann's *Beiblätter*, 3) by pressure of steam on water, in a cylinder, forcing out the water as a jet below. A float on the water in the cylinder works, in a simple way, the opening and closure of the valves for admission and escape of the steam, and the vacuum produced by condensation of steam in a condenser opens valves for readmission of water. The hot water layer, which forms on the liquid surface, and the wooden lining of the cylinder, reduce the condensation during expulsion of the water to a minimum. A comparison of the working of the author's vessel with that of the *Water-witch* and *Rival* (also propelled by hydraulic reaction) showed that while the kinetic energy of the expelled water was in the *Water-witch* 31.5 per cent. of the indicated quantity of steam, and in the *Rival* 26.3 per cent. in the (so-called) "hydromotor" it was 89 per cent. Herr Fleischer, in a recent brochure, investigates the physics of his motor.

If those members of the Quekett Microscopical Club who intend to be present on the occasion of the opening of Epping Forest by Her Majesty on Saturday next, the 6th inst., will communicate with the Hon. Sec. of the Quekett Microscopical Club, 7, The Hill, Putney, S.W., he will do his best to find places for their accommodation.

WITH reference to our notice of "Through Siberia" (vol. xxv. p. 582), the Rev. H. Lansdell writes that in the List of Illustrations at the commencement of vol. i. he acknowledges the sources whence they are taken; and with reference to the photograph of a "Buriat girl" he states that he bought the photograph, in the Buriat country, of the man who took it, that the girl was known even by name to his local friends, and that he has every reason to believe she was a pure Buriat and not a metis.

THE additions to the Zoological Society's Gardens during the past week include a Rhesus Monkey (*Macacus erythraeus* ♂) from India, presented by Mrs. Lamprey; a Chinese Tiger (*Felis tigris* ♂) from China, presented by Mr. G. Brown; two Bauer's Parrakeets (*Platycercus zonarius*) from Australia, presented respectively by Mr. J. Charlton Parr, F.Z.S., and Miss Eva Maitland; a Mississippi Alligator (*Alligator mississippiensis*) from Florida, U.S.A., presented by Master Bennett; a Slow-worm (*Anguis fragilis*), British, presented by Mr. Poyer Poyer; two Axolotls (*Siredon mexicanus*) from Mexico, three European Pond Tortoises (*Emys europaea*), five Carpathian Scorpions (*Scorpio carpathicus*) from Italy, presented by Mr. T. D. G.

Carmichael; a Black-backed Piping Crow (*Gymnorhina tibicen*) from Australia, deposited; two Common Squirrels (*Sciurus vulgaris*), British, two Green-horned Parrakeets (*Nymphicus uvaensis*) from the Island of Uvea, Loyalty group, purchased; a Black-backed Kaleege (*Euplocamus melanotis*) from Sikkin, received in exchange; a Hybrid Paradoxure (between *Paradoxurus larvatus* and *Paradoxurus leucomystax*), two Variegated Sheldrakes (*Tadorna variegata*), bred in the Gardens. The following insects have been exhibited in the Insect House during the past month:—Butterflies: *Papilio podalirius*, *Anthocharis cardamines*, *Araschnia levana*, *Thais polyxena*. Moths: *Deilephila euphorbia*, *Charocampa elenor*, *Sphinx pinastri*, *Saturnia pyri*, *S. carpinii*. Silk Moths: *Attacus roylei*, *Actias selene*, *A. luna*, *Telea polyphemus*. The insects have, with few exceptions, been very good specimens.

OUR ASTRONOMICAL COLUMN

THE PRESENT COMET.—The following orbit of the comet discovered by Mr. Wells on March 17 has been calculated by Mr. Hind from the Harvard College and Albany observations on March 17, and observations by Prof. Tacchini at the Collegio Romano in Rome on April 6 and 21; the small corrections were taken into account:—

Perihelion passage, June 10^h 69852 M.T. at Greenwich.

Longitude of perihelion ...	53° 47' 46".3	} From mean equinox 1882 ^o .
" ascending node ...	205° 8' 2".6	
Inclination ...	73° 57' 47".2	
Logarithm of perihelion distance	8.796420	
Motion—direct.		

Hence the positions for Greenwich midnight will be—

	R.A. h. m. s.	Decl.	Log. distance from Earth. Sun.
May 4 ...	21 19 11 ...	+71° 31' 3"	9.9870 ... 0.0670
5 ...	21 36 12 ...	72 19 0	
6 ...	21 54 57 ...	73 1' 5"	9.9793 ... 0.0502
7 ...	22 15 27 ...	73 37 7	
8 ...	22 37 35 ...	74 6 4	9.9724 ... 0.0324
9 ...	23 1 9 ...	74 26 4	
10 ...	23 25 49 ...	74 36 9	9.9664 ... 0.0134
11 ...	23 51 6 ...	74 37 1	
12 ...	0 16 22 ...	+74 26 4	9.9612 ... 9.9932

If the intensity of light on March 19 be taken as unity, the intensity on May 12 is 15.6.

The perihelion distance is given by different computers as follows:—

Kreutz—observations to April 7 ...	0.06343
Lamp " " 9 ...	0.06123
Oppenheim " " 11 ...	0.06459
Hind " " 21 ...	0.06258

From the above elements it will be found that at the ascending node the comet makes a close approach to the earth's orbit, the distance being only 0.0048, or, assuming 8"848 for the solar parallax, 443,500 miles, roughly twice the distance of the moon. The ascending node is passed on July 11, but the earth will be far from that point of her orbit.

THE SO-CALLED *Nova* of 1848.—There does not appear to be any recent notice of the magnitude of this object, though the last published observations by Dr. Julius Schmidt in 1868 showed that it had not sensibly changed for some years. It was slightly over 13m. Its position for 1880.0 is in R.A. 16h. 52m. 46.5s., N.P.D. 102° 42' 26". Webb in the last edition of his "Celestial Objects for Common Telescopes," p. 356, says: "colour very fine, 1875," but this note must surely refer to some other object, the *Nova Ophiuchi* of 1848, having been too faint for years past to show striking colour. Perhaps some reader of NATURE may be able to state what is its present degree of brightness. There are two stars having the following positions with reference to *Nova* which may assist its identification.

11m. ...	Angle 249° 4	Distance 7' 55"
10.11m. ...	" 144° 5	" 8' 51"

It follows a 9m. Lalande-star 14.7s., and is 18' 22" north of it. In 1874 it was below the twelfth magnitude.